

basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1556	(2000) Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft) (2,700 kN-m/m ³)
ASTM D 2167	(1994; R 2001) Standard Test Method for Density and Unit Weight of Soil In-Place by the Rubber-Balloon Method
ASTM D 75	(2003) Standard Practice for Sampling Aggregates

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD 621	(Rev A; Notice 2) Test Method for Pavement Subgrade, Subbase, and Base Course Materials
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1.2 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed

item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waybills or Delivery Tickets shall be submitted in accordance with the paragraph entitled "General" of this section

SD-04 Samples

Unless otherwise directed, sampling of Limerock shall be in conformance with ASTM D 75, except for density tests. Samples for density tests shall conform to ASTM D 1557. The minimum size sample hole for the density test shall be 0.00014 cubic meter 0.050 cubic foot for 13 millimeter 1/2-inch maximum particle size, 0.002 cubic meter for 25 millimeter 0.075 cubic foot for 1-inch maximum particle size, and 0.0028 cubic meter for 50 millimeter 0.100 cubic foot for 2-inch maximum particle size. Samples to be used as the basis for final approval in determining density shall be obtained under observation of the Contracting Officer.

SD-06 Test Reports

Test Reports from samples shall be submitted by the Contractor not less than 30 days before material is required in the work. Final approval of material shall be the completed layer ready for next layer.

1.3 DEFINITIONS

Degree of compaction shall conform to ASTM D 1556.

Coverage is the application of one tire print over each point in the surface of the designated area.

1.4 QUALITY ASSURANCE

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved testing laboratory or by the Contractor, subject to approval. Tests shall be performed to ensure that materials meet specified requirements. Copies of test results shall be furnished to the Contracting Officer.

1.5 OPERATION OF MATERIAL SOURCES

Clearing, stripping, and excavating involved in the operation of pits or quarries shall be performed by the Contractor. Pits or quarries on private lands shall be conditioned in agreement with the local laws and authorities.

PART 2 PRODUCTS

2.1 GENERAL

Limerock shall consist of fossiliferous limestone of uniform quality, containing no hard or flinty pieces to prevent construction of a smooth pavement surface free of pits or pockets. Limerock shall be obtained from pits where overburden has been removed previous to blasting. Limerock shall show no tendency to air-slake and shall undergo no chemical change when exposed to weather; it shall contain not more than three percent roots, leaf mold, or other organic matter. Broken limerock shall conform to the following gradation: 100 percent shall pass a 38 millimeter 1-1/2-inch mesh sieve and shall be continuously well graded down to dust. Fine materials shall consist of the dust and fine particles of fracture. In no case will material be permitted which has a liquid limit in excess of 25 or a plasticity index in excess of 5 when tested in accordance with Method 103 of MIL-STD 621. Chemical analysis of limerock shall consist of determining the insoluble silica, the iron oxide, and the alumina by solution of sample in hydrochloric acid; by evaporating, dehydrating, redissolving, and neutralizing the residue with ammonium hydroxide; and by filtering, washing, and igniting the residue limerock. The difference between the percentage of insoluble matter and 100 percent is reported as carbonates of calcium and magnesium. Limerock shall be either Ocala or Miami oolite.

Waybills or Delivery Tickets shall be submitted during progress of the work.

2.2 OCALA LIMEROCK

Ocala limerock shall be composed of not less than 90 percent carbonates of calcium and magnesium from approved deposits.

2.3 MIAMI OOLITE LIMEROCK

Miami oolite limerock shall be composed of not less than 75 percent carbonates of calcium and magnesium and not more than 2 percent oxides of iron and aluminum. Any component other than the carbonates and oxides shall be silica.

2.4 TESTING

For purposes of geological designation, all Limerock mined north of the 28th degree parallel of latitude in the State of Florida shall be tested as and shall meet the requirements specified above for Ocala limerock; all limerock mined south of that parallel shall be tested as and shall meet the specified requirements for Miami oolite limerock. Test Reports shall be submitted for approval.

PART 3 EXECUTION

3.1 EQUIPMENT

All plant, equipment, tools, and machines used in the performance of the work covered by this section shall be subject to approval by the Contracting Officer and shall be maintained in satisfactory working condition at all times.

3.1.1 Rollers

Rollers shall be self-propelled and shall be of such a type and weight that sufficient compactive effort will be exerted on the stabilized area to obtain the required density.

3.1.2 Blade Graders

Blade graders shall have a wheel base of not less than 4570 millimeter 15 feet, a blade of not less than 3660 millimeter 12 feet, and shall be self-propelled.

3.1.3 Sprinkling Equipment

Sprinkling equipment shall consist of tank trucks, pressure distributors, or other equipment designed to apply water uniformly and at controlled quantities to variable widths of surface.

3.1.4 Pulvermixer

Pulvermixer may be tow-type or self-propelled and shall have variable mixing speed to allow smooth, uniform mixes to the full depth of section shown on the drawings.

3.1.5 Hauling Equipment

Hauling equipment shall consist of pneumatic-tired vehicles having dump bodies suitable for dumping materials on the subgrade or select material base course.

3.1.6 Tampers

Hand tampers shall weigh not less than 23 kilograms 50 pounds and shall have a face area of not more than 0.065 square meter 100 square inches. Mechanical tampers shall be of an approved type.

3.1.7 Miscellaneous Equipment

Scarifiers, tractors, spring-tooth or spike-tooth harrows, windrow equalizers, spreaders, and other equipment shall be of approved types, suitable for constructing stabilized aggregate base course.

3.2 PREPARATION OF SUBGRADE

Prior to constructing the limerock stabilization, the subgrade shall be cleaned of foreign substances. Surface of the subgrade or subbase course shall be inspected for adequate surface tolerances.

Ruts or soft, yielding spots that may appear in the subgrade or subbase course, areas having inadequate compaction, and deviations of the surface from the requirements in the applicable section shall be corrected. Correction shall be performed by loosening the affected areas, removing unsatisfactory material, adding approved material, and by reshaping and recompacting to line and grade to the specified density requirements, as directed.

3.3 GRADE CONTROL

The finished and completed surface course shall conform to lines, grades,

cross sections, and dimensions as indicated. Lines and grades shall be maintained as indicated by means of line and grade stakes placed at the worksite.

3.4 FURNISHING WATER

**NOTE: When the "special provisions" adequately
provide for sufficient water for the construction of
the base course, this paragraph must be deleted.**

Provisions shall be made by the Contractor for furnishing water at the site of the work by equipment of such capacity and design as will ensure application of the approved amounts of each of the construction operations in the following paragraphs.

3.5 PLACING AND MIXING OF MATERIALS

The loads of stabilizing material shall be spotted on the area to be established according to theoretical yield, as computed by the following formula:

$$\text{Area in Sq Yd} = \frac{\text{No. of Cu Meter Yd in load} \times \frac{36}{\text{No. of millimeter inches of loose measure limerock required}}}{1}$$

Stabilizing material shall be placed and spread uniformly to such a depth and width, that when the work is completed, the requirements of the typical cross section will have been fulfilled. Stabilizing material shall be thoroughly mixed with the soil by a pulvermixer and bladed until the treated areas are uniform. Surface shall then have water added as required and be bladed, shaped, and smoothed so that it will compact to the grade and typical cross section required.

3.6 COMPACTION

When the stabilized areas have been bladed, shaped, and smoothed to the grades or levels required, the areas shall have water added as required and shall be rolled with tamping rollers, power rollers, or by combination thereof. Rolling shall continue until the layer or layers are compacted through the full depth to at least 100 percent of the maximum density as determined by test procedure presented in MIL-STD 621, Method 100, Compaction Effort Designation CE-55. Surface of the layer shall be finished by blading and rolling with a power roller or rubber-tired rollers, or combination thereof. In all places not accessible to the rolling equipment, the mixture shall be compacted with tamping equipment as specified. Blading, rolling, and tamping shall continue until the surface is smooth and free from waves and inequalities. If at any time the mixture is excessively moistened by rain, it shall be aerated by means of blade graders, harrows, or other approved equipment, until the moisture content of the mixture is satisfactory; the surface shall then be recompacted and finished as specified above.

3.7 TESTS

3.7.1 Smoothness Test

Surface shall show no deviations in excess of 10 millimeter 3/8 inch when tested with a 3050 millimeter 10-foot straightedge applied parallel with and at right angles to the centerline of the paved areas. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, reshaping, watering, and compacting.

3.7.2 Thickness

Thickness of the stabilized subbase, shoulder, or other areas shall be not less than that shown on the drawings, and shall be measured at intervals in such a manner that there will be a depth measurement for at least 418 square meter 500 square yards of completed stabilization. Depth measurements shall be made by test holes, at least 75 millimeter 3 inches in diameter through the subbase, shoulder, or other areas. Where the deficiency is more than 13 millimeter 1/2 inch, the Contractor shall correct such areas by scarifying, adding stabilizing material, watering, reblading, and recompacting. Where the thickness is more than called for on the drawings, it shall be considered as the specified requirement.

3.7.3 Density Control

During construction and upon completion of the stabilized area, field density tests shall be performed in sufficient numbers to ensure that required density is being obtained. These tests shall be made by the Contractor and shall be in accordance with ASTM D 1556, Method D, or ASTM D 2167, except that the volume occupied by the sample prior to removal shall not be determined through the use of oil.

-- End of Section --